REMARKS

Reconsideration and continued examination of the above-identified application are respectfully requested. The amendment to the independent claims recite the conductive modified particles described at pages 7-10 of the present application and elsewhere. Full support exists. Accordingly, no questions of new matter should arise.

At page 2 of the Office Action, the Examiner rejects claims 1-5, 7-26, and 28-40 under 35 U.S.C. §102(b) as being anticipated by Lewis et al. (U.S. Patent No. 5,571,401). The Examiner provides more details of the rejected claims at pages 2-3 of the Office Action. To summarize, the Examiner states that, regarding claims 1 and 22, Lewis et al. shows a sensor having conductive modified particles, wherein the sensor is electrically connected to an electrical measuring apparatus (column 3, line 36-column 8, line 17). The Examiner further states that Lewis et al. shows the incorporation of various organic conducting polymers (column 4, lines 18-34). The Examiner also states that, regarding claims 2 and 22-24, Lewis et al. shows that the sensor may be an array of sensors, wherein an individual sensor may comprise regions of conducting and non-conducting materials (column 1, line 65-column 2, line 39; column 3, lines 40-48). Insofar as claims 3, 24, and 31, the Examiner states that Lewis et al. shows that the conductive modified particles may include carbon products having at least one attached organic group (column 4, lines 7-65). Insofar as claims 4, 5, 11, 25, 26, and 32, the Examiner states that Lewis et al. shows the use of carbon black having attached at least one organic group (column 4, lines 17-34). Insofar as claims 7 and 28, the Examiner states that Lewis et al. shows an aggregate of a mixture having a carbon phase, such as carbonaceous material and semiconductors (column 4, lines 7-64). Insofar as claims 8 and 29, the Examiner states that Lewis et al. shows the

incorporation of a metal containing phase, such as a gold-copper alloy, semiconductors, and conductive metal oxides (column 4, lines 19-34). Insofar as claims 9, 10, 12, 13, 30, 33, 34, and 37, the Examiner states that Lewis et al. shows the incorporation of partially coated carbon black material having attached at least one organic group, such as an organic conducting polymer (column 3, line 34-column 4, line 65). Insofar as claims 14-16, and claims 35 and 36, the Examiner states that Lewis et al. shows the use of organic polymers containing ionizable groups (column 4, lines 7-65). Insofar as claim 17, the Examiner states that Lewis et al. shows that each sensor in an array provides a different response for the same analyte with a detector that is operatively associated with each sensor (column 1, line 65-column 2, line 39; column 7, lines 23-58). Insofar as claim 18, the Examiner states that Lewis et al. shows that the sensor arrays include a plurality of compositionally different chemical sensors (column 3, line 40-column 4, line 65). Insofar as claims 19, 20, and 38, the Examiner states that Lewis et al. shows a method for detecting the presence of an analyte in a fluid using a sensor array (column 3, line 40-column 4, line 6; column 7, line 23-column 8, line 19). Insofar as claim 21, the Examiner states that Lewis et al. shows that the method may further include a means to compare the response with a library of responses to match the response in order to determine the presence or the concentration of the analyte (column 7, lines 14-18). Insofar as claim 39, the Examiner states that Lewis et al. shows that the detector may be optimized to detect resistance (column 2, lines 1-39). Insofar as claim 40, the Examiner states that Lewis et al. shows that the method may incorporate a second sensor, wherein the sensor has regions of conducting and non-conducting materials (column 1, line 65-column 2, line 39; column 3, lines 40-48). For the following reasons, this rejection is respectfully traversed.

As a starting point, one must appreciate an important distinction between the primary reference and the claimed invention. Lewis et al. describes sensors having conventional conducting and non-conducting materials arranged in a matrix of conducting and non-conducting regions. These sensors are conventional in nature. However, the present invention is significantly different. As set forth in claim 1, the sensor includes a layer comprising conductive modified particles. These modified particles can be, for instance, conductive particles having at least one organic group attached to the particles. The wide variety of conductive particles, the specific structural details of the conductive modified particles, and the methods of making such particles are set forth at great length in the application, for instance, at page 7, line 18, to page 12, line 21, and in the publications or documents incorporated by reference therein. Other detailed examples of organic groups that can be attached are found throughout the application. For instance, the use of polymeric groups is described at page 18, line 1 through page 19, line 24 of the application.

By contrast, Lewis et al. does not teach the use of conductive modified particles as shown in the present application. While there is an isolated reference to carbon black in Lewis et al. at column 4, there is no mention of organic groups being attached to these particles. The list of species set forth in columns 3 and 4 of the cited reference are varied, but the Examiner has not identified any specific reference to the kind of modified particles described in the application, and more specifically the kind of modified pigment particles of the present application. The carbon black used in Lewis et al. is traditional carbon black. The remaining conductive particles referred to by the Examiner are quite different from the claimed invention.

The application contains four independent claims: 1, 19, 22, and 38. All four of these claims recite the specific feature that at least one conductive modified particle is present.

Regardless of the additional limitations of the dependent claims identified by the Examiner at pages 2-3 of the Office Action, the dependent claims are dependent on one of four independent claims that recite a feature that is not present in the cited reference. Therefore, as the rejection to the base claims is overcome, all the dependent claims are patentable as well. Accordingly, for all of the reasons set forth above, the rejection to the identified claims should be withdrawn.

At pages 4-5 of the Office Action, the Examiner rejects claims 6 and 27 under 35 U.S.C. §103(a) as being unpatentable over Lewis et al. in view of Li et al. (Langmuir 1993, 9, pages 3341-3344). The Examiner admits that Lewis et al. does not show the incorporation of C_{60} buckyballs as a sensing platform. However, the Examiner states that Lewis et al. shows that individual elements may be optimized for a particular application by varying their chemical makeup and morphologies (column 6, lines 9-46), and that Lewis et al. further states that the conductive particles may comprise carbon particles having at least one attached organic group (column 4, lines 7-65). The Examiner states that Li et al. shows the incorporation of self-assembled buckyballs with a surface wave sensor (pages 3341-3342; Figure 1). The Examiner further states that Li et al. stands for the proposition that sensor selectivity depends on the optimal chemical or physical interactions between the analyte and the sensing layer, such as the mutual matching of polarity, size, and structural properties (pages 3343-3344). The Examiner then concludes that it would have been obvious for one of ordinary skill in the art to incorporate the C_{60} buckyballs having attached at least one organic group as a sensing platform, as taught by Li et al., with the sensing device described in Lewis et al., in order to provide for an optimized sensing device. For the following reasons, this rejection is respectfully traversed.

First, as noted above, both claims 6 and 27 are dependent on claim 1 or 22, which recite a specific feature, i.e., the presence of at least one conductive modified particle, which is not present in the cited reference. Therefore, no combination using Lewis et al. could generate the present invention, as the conductive modified particle is not present in the primary reference, and, accordingly both claims 6 and 27 would be patentably distinct as well. Lewis et al. does not teach or suggest a modified particle, such as a particle having attached at least one organic group. Thus, Lewis et al. would not motivate anyone to use modified particles. Second, the portion of Lewis et al. cited by the Examiner relating to varying chemical makeup and morphologies (column 6, lines 9-46) is highly general in nature. There is nothing in the cited text that indicates that functionalized buckyballs would be an obvious, or even likely, choice to combine with Lewis et al. The same conclusion applies to the portion of Li et al. There is simply no definite line of reasoning advanced by the Examiner or common element of the references which would suggest the combination of Lewis et al. and Li et al. Therefore, a person of ordinary skill in the art would not be likely to combine with teachings of the two references, and it cannot fairly be said that the two references teach or suggest the claimed invention, either singly or in combination.

Finally, it is not clear exactly what would result from a combination of Lewis et al. and Li et al., or whether such a combination would even be physically possible. In a general sense, the Li et al. reference describes a molecular self-assembly approach to surface acoustic wave thin-film chemical microsensors. More specifically, it appears that the structural result shown in Li et al. is a C_{60} superlattice, consisting of buckeyballs linked to one another by silicon oxygen bonds, and further bound to an SAW resonator surface, as shown in Figure 1 of the reference. If one attempted to combine the technology of Li et al. with that of Lewis et al., it would seem to involve the

production of a C_{60} superlattice bound to some other layer, through self-assembling techniques, as set forth at pages 3341-42 of Li et al. However, specific superlattice terminology is not found in either the identified claims or the portions of the Lewis et al. reference cited by the Examiner. In Lewis et al. the resistors are fabricated by blending a conductive and a non-conductive layer, as set forth at column 3, lines 51-56. There is no reference in the cited text to the specific self-assembly technology as described in Li et al. and it is not clear how the self-assembling technique with bonding to a specific surface (like an SAW sensor) could be accomplished through physical blending. Therefore, it is not clear how one would physically combine the teachings of the two references, or how such a combination would generate the claimed invention.

In summary, it would not be obvious for a person of ordinary skill in the art to combine the two references, and, even if such a combination was tried, it is not clear how one could combine the teachings of the two references, or what combination would result from trying to do so. Accordingly, this rejection should be withdrawn.

At pages 5-6 of the Office Action, the Examiner rejects claims 6 and 27 under 35 U.S.C. §103(a) as being unpatentable over Lewis et al. in view of Ajayan (Chemical Review 1999, 99, pages 1787-1799). The Examiner admits that Lewis et al. does not specifically show the incorporation of carbon nanotubes as a sensing platform. However, the Examiner argues that Lewis et al. shows the incorporation of various carbonaceous materials, and that the reference further shows that individual elements can be optimized for a particular application by varying their chemical makeup and morphology (column 6, lines 9-49). The Examiner further states that Lewis et al. shows that the conductive modified particles may be carbon products having attached at least one organic group (column 4, lines 7-65). The Examiner states that the Ajayan reference shows the

use of carbon nanotubles in sensors, and further states that the nanotubes may be functionalized with various groups and used as probes in chemical or biochemical applications (page 1797). The Examiner also states that Ajayan shows that polymers may be physically doped or filled with nanotubes (page 1796). The Examiner concludes that it would have been obvious for one of ordinary skill in the art to incorporate carbon nanotubes having attached at least one organic group as a sensing platform, as shown in Ajayan, with the sensing device shown by Lewis et al. in order to provide for an optimized sensing device. For the following reasons, this rejection is respectfully traversed.

First, as previously noted in conjunction with Li et al., both claims 6 and 27 are dependent on claim 1 or 22, which recite a specific feature, i.e., the presence of at least one conductive modified particle, which is not present in the cited reference. Lewis et al. simply does not show a modified particle, as that term is understood in the present application. Therefore, no combination using Lewis et al. could generate the claimed invention, as the conductive modified particle is not present in the cited reference. Second, the portion of Lewis et al. cited by the Examiner relating to varying chemical makeup and morphologies (column 6, lines 9-46) is highly general in nature. There is nothing in the cited text that indicates that functionalized nanotubes would be an obvious, or even likely, choice to combine with Lewis et al. There is simply no definite line of reasoning advanced by the Examiner or common element of the references which would suggest the combination of Lewis et al. with a unique element like a carbon nanotube. These two references do not teach or suggest the claimed invention. Therefore, a person of ordinary skill in the art would not combine the teachings of the two references.

Finally, it is not clear exactly what would result from a combination of Lewis et al. and Ajayan, or whether such a combination would physically even be possible. In a general sense, Ajayan is a review article discussing the properties of carbon nanotubes in broad terms. The portions of the text cited by the Examiner do not have a substantial connection to the technology of the claimed invention. For instance, the text cited by the Examiner with respect to doping of polymers (the last paragraph at page 1796) refers to a conjugated luminescent polymer, an application that bears no obvious relationship to the claimed invention. The other text cited by the Examiner with respect to local chemistry and biochemistry (first full paragraph at page 1797) mentions nanotitration and the use of ATM tips to image patterned samples based on molecular interactions and forces in biomolecular interactions. These are highly specific applications that are not even discussed in significant detail in the review article. The entire discussion in Ajayan comprises only a few sentences, and bears no obvious relationship to the claimed invention, which concerns chemical sensors. The Examiner has not explained, nor can the applicants understand, how a nanotube for nanotitration could be combined with the technology set forth in Lewis et al. to generate the claimed invention, which is unrelated to nanotitration. Similar considerations apply to the use of AFM technology to measure biomolecular interactions. The references are simply unrelated. In light of that, a person of ordinary skill in the art would be unable to identify enough of a common element to combine the two references.

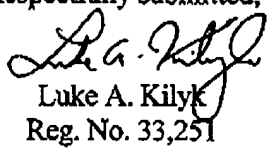
In summary, it would not be obvious for a person of ordinary skill in the art to combine the two references, and, even if such a combination was tried, it is not clear how one could physically combine the teachings of the two references, or what combination would result from trying to do so. Accordingly, this rejection should be withdrawn.

CONCLUSION

In view of the foregoing remarks, the applicants respectfully request the reconsideration of this application, and the timely allowance of all the pending claims.

If there are any other fees due in connection with the filing of this response, please charge the fees to Deposit Account No. 03-0060. If a fee is required for an extension of time under 37 C.F.R. §1.136 not accounted for above, such extension is requested and should also be charged to said Deposit Account.

Respectfully submitted,



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